

Subject: Least Risk Bomb Location (LRBL)	Date: DRAFT 5/15/02	AC No: 25.795 (c)
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1. **PURPOSE:** This Advisory Circular discusses the rulemaking action which implements ICAO Annex 8, Appendix 97 Standards, pertaining to an airplane design requirement for a Least Risk Bomb Location (LRBL) for all new passenger airplanes with greater than 60 seats or a 100,000 Pounds MTOW and the requirement that those LRBL procedures be made available to the flight crew during flight.
 - a. The means of compliance described in this document is intended to provide guidance to supplement the engineering and operational judgment that must form the basis of any compliance findings relative to the certification requirements.
 - b. Like all advisory circular material, this AC is not, in itself, mandatory, and does not constitute a regulation. It is issued to describe an acceptable means, but not the only means, for demonstrating compliance with the requirements for transport category airplanes. Terms such as 'shall' and 'must' are used only in the sense of ensuring applicability of this particular method of compliance when the acceptable method of compliance described in this document is used.

This advisory circular does not change, create any additional, authorize changes in, or permit deviations from, regulatory requirements.

2. **RELATED FAR SECTIONS:** Title 14, Code of Federal Regulations (14 CFR) Parts 25 and 121:

§ 14 CFR 25.795 Security Considerations
§ 14 CFR 25.1585 Operating Procedures
§ 25 CFR 121.135 Contents

3. **FORMS AND REPORTS:**

“FAA Recommended In-Flight-Emergency Safety Procedures for Suspect Device (“Bomb”) On Board (Least Risk Bomb Location {LRBL} Procedures)”, Sensitive Security Information (Limited Distribution)

- Available upon request to those with a certified “need to know” from:

TSA Explosives Unit, ACS-50
800 Independence Avenue, SW
Washington, DC 20591
FAX: 202-493-4263

Requests should be in writing on official letterhead stating a need for the information. Include an e-mail address for a prompt reply. These procedures are exempted from general public disclosure under 5 USC 552.

4. **DEFINITIONS:**

Least Risk Bomb Location (LRBL): The location on the airplane where a bomb or other explosive device should be placed to minimize the effects to the airplane in case of detonation.

5. **GENERAL GUIDANCE FOR ESTABLISHING AN LRBL**

- a. **Historical Practice.** The FAA recommended Least Risk Bomb Location procedures (LRBL), which have evolved since 1972 with voluntary participation by the airplane manufacturers, have been demonstrated to significantly reduce the effects of an explosion in the passenger cabins of large commercial airplanes using only readily available materials.

The ICAO Security Manual also provides guidance to operators on the procedures to invoke once a suspect item is found onboard an airplane. Information is also provided on the location of the LRBL.

- b. Purpose. The purpose of this guidance material is to establish those areas of concern that need to be addressed when finding compliance with the rule. These include the amplifying effects of the pressure differential between the cabin and the outside air. These can be significant and maximum damage is sustained when an explosion occurs in a fully pressurized airplane.

When a suspect item is encountered in the cabin of an airplane in-flight, measures to minimize its effect include a partial reduction in the cabin pressure, with full depressurization preferred, to reduce the damage caused by an explosion. Other possible countermeasures may include procedures to minimize the loss of the integrity of the structure or systems, the use of explosive containment devices, and operational procedures established in consideration of the airplane performance.

- c. Design Considerations. The previous voluntary approach to LRBL, that is, identification of the safest location after the basic design was completed, would not necessarily provide the enhancements to safety that would be possible if the LRBL were included in the initial design process. Therefore, additional features may need to be explored to improve safety. Design considerations may include specially sized areas or pressure relief panels in the cabin structure where a suspect device should be placed by crewmembers. On airplanes with more than one passenger deck, more than one LRBL may be desirable.

6. LRBL IDENTIFICATION AND DESIGN

- a. When determining the Least Risk Bomb Location (LRBL), the following operational and design issues should be addressed:
 - (1) If a site adjacent to the fuselage skin is chosen, a portion of the structure should be assumed to be lost. The structural capability of the airplane in the presence of the resulting opening should be determined. For example, if the LRBL is a door, the entire door should be assumed to be lost. An area that is not a door should consider the following:
 - i. The LRBL fuselage-skin blowout area must be discontinuous from the surrounding structure so cracks developed in the blowout section cannot propagate into the surrounding structure.
 - ii. The dimensions of the LRBL blowout region should be no smaller than a 30-inch diameter circle. However, those dimensions may be reduced to no less than a 20-inch diameter circle on airplanes with a maximum type certificated passenger capacity of less than 90, if standard arrangements and other considerations prevent a larger diameter.
 - iii. Adequate space must be available to place the attenuating materials required by the operational procedures.
 - iv. Assure that provisions allow for the placement of the suspect device as close

to the fuselage skin as possible. That is, interior features (galleys, closets, seats etc.) should not obstruct access to, or the space available for, the LRBL.

- (2) The location of the LRBL should be based on considerations of the secondary effects from structural losses to other parts of the airplane (e.g. ingestion of debris into engine, large mass strikes on tailplane, smoke, fire etc) or passenger hazard.
- (3) System integrity should be evaluated in the area likely to be affected around the LRBL. Wherever practicable, flight critical systems should be kept 18 inches away from the established LRBL contours, as shown in Figure 1. In addition, flight critical systems should also be kept out of the area under the floor at the LRBL, for a distance of 30 inches inboard, over the width of the LRBL cutout, also shown in Figure 1). This applies to systems that are attached to the floor beams, or mounted above the bottom of the floor beams. This guidance is separate from the requirement of 25.795(d).

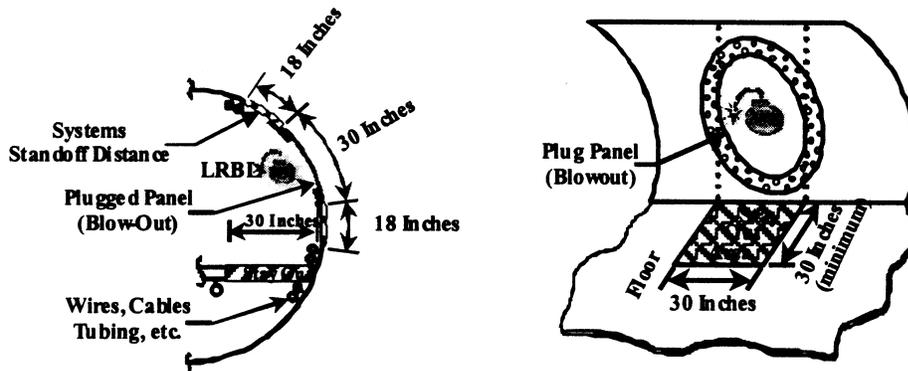


Figure 1. LRBL Design Dimensions

- (4) Where the criteria provided in paragraph 6.a.(3) would conflict with the requirements of 25.795(d), maximizing system separation takes precedence. However, in this case, consideration should be given to adding fragment and large structural deformation protection to systems that must be run in proximity to the LRBL.

Systems shielding and/ or inherent protection must be able to withstand fragment impacts from 0.5-inch diameter 2024-T3 aluminum spheres traveling 430 feet per second. The ballistic resistance of 0.09-inch thick 2024-T3 aluminum offers an equivalent level of protection. System designs must incorporate features that minimize the risk of their failure due to large displacements of the structure to which they are attached. This may include flexibility in both the systems and/or their mountings. In the absence of test evidence or alleviating rationale, provisions should allow for a minimum 6-inch displacement in any direction from a single point force applied anywhere within the protected region. Frangible attachments or other features that would preclude system failure may also be

incorporated.

- b. Traditionally, the LRBL has been chosen to be at a location where there is intrinsic structural reinforcement. However, other measures may be taken to meet the intent of the rule. An example would be a containment system. Such an approach would require concurrence of the Administrator to establish the appropriate criteria.
- c. In most circumstances, it is preferable to reduce the cabin pressure differential to zero. Reductions of fuselage pressure are known to be an extremely effective measure in ensuring structural integrity in the event of a detonation.
- d. The operational requirements of 121.135(b)(24) require that information on the LRBL be available to the flight crew during flight. The LRBL is required to be identified in the flight manual, and should be presented concisely and in a form that is easily understood.
- e. Destructive testing is not required.